Decarbonisation of the steel production –
Climate strategy of thyssenkrupp

January 2020 | Arnheim | thyssenkrupp Steel Europe AG
thyssenkrupp – a diversified industrial group
Leading engineering expertise from one source
High degree of internationalization

Group companies and representative offices in 78 countries

Over 60% of employees work outside Germany

Over 70% of Group sales are generated outside Germany
thyssenkrupp Group – the business areas

Components
Technology

Elevator
Technology

Industrial
Solutions

Materials
Services

Steel
Europe

Employees

34,464

53,081

16,062

20,340

28,278
Paris Agreement 2015

195 countries

<2° joint efforts to limit global warming

2050 Klimaneutral Climate Neutral

makes its contribution and will be climate-neutral by 2050
We have defined clear interim goals

-30% Emissions from our own production operations and processes\(^1\)

2030 -30% Emissions from energy procurement\(^2\)

\(^1\) SCOPE 1-Emissions; \(^2\) SCOPE 2-Emissions (Base year 2018)
Changes take time

Our industry is energy- and plant-intensive and involves long investment cycles.

Steel production accounts for 95% of thyssenkrupp’s direct emissions.
Two paths towards carbon neutrality

CO$_2$ avoidance (CDA)

- Use of hydrogen in blast furnace operations
- Use of hydrogen in direct reduction plants
- Use of electric arc furnaces

CO$_2$ processing (CCU)

- Conversion of steel mill gases into valuable chemicals
- Carbon2Chem technology is already available today
From 2019
The test
thyssenkrupp replaces injection coal at one blast furnace (BF) successively with hydrogen (H₂).

From 2020
The industrialization
The pilot plant produces continuously chemicals from steel mill gases arising in the Duisburg steel mill.

2018
The world premiere
The concept: CO₂ is turned into a raw material. In September 2018 thyssenkrupp produced methanol from steel mill gases in the Technical Center Carbon2Chem® in Duisburg for the first time.

From 2022
The introduction phase
The three other blast furnaces (BF) are gradually converted to H₂ supply.

From 2024
The milestone
thyssenkrupp produces sponge iron in large-scale direct reduction plants (DR), which are to be operated in the future with green H₂; this sponge iron is processed in a first step in the blast furnaces (BF), enabling further emission reductions.

From 2025
The breakthrough
In a large-scale plant, CO₂ is used as a raw material on an industrial scale. Carbon2Chem® technology can also be used by other industries, such as the cement industry.

2025 to 2050
Transformation into a climate-neutral steel mill
thyssenkrupp processes sponge iron into crude steel in a climate-neutral process in electric arc furnaces (EAF), using electricity from renewable energy sources.
The hydrogen path: Covering the hydrogen demand

- Produced in existing industrial processes (e.g. refineries and chemical plants)
- Available, but causes CO₂ emissions

- Produced from natural gas
- Available in the medium term and climate-neutral using offshore CCS

- Produced by electrolysis with electricity from renewable energies
- Climate-neutral
- Large quantities only available in the long term

Complete climate neutrality in steel requires large amounts of green hydrogen
The political framework conditions are essential for the success of our transformation.
1. A competitive energy and hydrogen supply for the transformation must be created now

- Climate-neutral steel production in Germany by 2050 implies an **additional power requirement of at least 130 TWh per year** for the required hydrogen – on the basis of renewable energies.

- A **coordinated political H₂ strategy at national and EU level** is needed which ensures that the demand can always be covered at competitive prices.

- Existing gas grids and transportation by ship must be used for **H₂ transport**. Hydrogen must primarily available to those sectors where it is de facto indispensable for CO₂ reduction.
2. The production conditions in Germany and Europe must not be deteriorated

- The conditions for **full compensation of the electricity price increases caused by emissions trading** must be created as quickly as possible.

- **Exemptions (EEG/KWKG) for electricity** from steel plants must be maintained. The increased external electricity purchase as a result of the climate strategy must be treated like self-produced electricity.

- If free allocation of allowances and electricity price compensation is not sufficient, a “**Carbon Border Adjustment**” should be considered.

- The **funds thus generated should be used to support the transformation** and, in particular, to develop the urgently needed gas and electricity infrastructure.
3. Markets must be created for the sale of climate-neutral steel

- There are still no incentives for customers to pay a higher price for climate-neutral steel. Consequently, the transformation is not yet economically viable for the steel producers.

- Therefore, the possibility of crediting climate-neutral steel against the emission targets of customer industries (e.g. the automotive industry) should be considered.

- Moreover, we support the introduction of so-called “Contracts for Difference“.

- In public procurement, requirements for the use of climate-neutral steel could be introduced.
4. The steel industry must remain attractive for investors

• Billions in investment are required for the transformation. The EU taxonomy must be designed in such a way that these investments are not hindered.

• Consequently, the requirements to be met by the steel industry must not be based on benchmarks that no steel mill can possibly fulfill. Otherwise, the steel industry is in danger of being “blacklisted“.

• On the contrary, the efforts of companies that invest massively in CO₂ reduction must be acknowledged.
Thank you for your attention!